CLAIMS

1. An encoding apparatus for adaptively carrying out field-based or frame-based encoding processing at a macroblock level with interlaced scan image information as an input, the encoding processing including lossless encoding processing carried out based on a CABAC scheme, the encoding apparatus comprising:

lossless encoding means for carrying out the lossless encoding processing using a context model corresponding to a frame/field flag indicating whether the encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.

2. The encoding apparatus according to claim 1, wherein the context model corresponding to the syntax element for carrying out the field-based encoding processing includes at least one of the context models corresponding to an MB_type for an I picture, an MB_type for a P/B picture, motion vector information, a reference field parameter, and an intra-prediction mode.

3. The encoding apparatus according to claim 1, wherein an expression ctx_fifr_flag(C)=a+2ba is satisfied,

where ctx_fifr_flag(C) is a context model related to a frame/field flag of a macroblock C and a and b are the values of frame/field flags of respective macroblocks A and B neighboring the macroblock C.

4. The encoding apparatus according to claim 1, wherein, if a macroblock C included in a P picture is subjected to the field-based encoding, an expression ctx_mb_type_inter_field(C)=((A==skip)?0:1)+2((B==skip)?0:1) is satisfied,

where ctx_mb_type_inter_field(C) is a first context model corresponding to an MB_type of the macroblock C and (A==skip)?0:1) and ((B==skip)?0:1) are operators indicating 0 or 1 depending on whether respective macroblocks A and B neighboring the macroblock C are a Skip mode.

5. The encoding apparatus according to claim 4, wherein, if a macroblock C included in a P picture is subjected to the field-based encoding, Code_Numbers 0 to 7 corresponding to an MB_type of the macroblock C are binarized into 0, 100, 101, 11000, 11001, 11010, 11011, and 11100, respectively.

6. The encoding apparatus according to claim 1, wherein, if a macroblock C included in a B picture is subjected to the field-based encoding, an expression ctx_mb_type_inter_field(C)=((A==Direct)?0:1)+2((B==Direct)?0:1) is satisfied,

where ctx_mb_type_inter_field(C) is a first context

model corresponding to an MB_type of the macroblock C and (A==Direct)?0:1) and ((B==Direct)?0:1) are operators indicating 0 or 1 depending on whether respective macroblocks A and B neighboring the macroblock C are a Direct mode.

7. The encoding apparatus according to claim 6, wherein, if a macroblock C included in a B picture is subjected to the field-based encoding, Code_Numbers 0 to 13 corresponding to an MB_type of the macroblock C are binarized into 0, 100, 101, 11000, 11001, 11010, 11011, 11100, 111000, 1110001, 1110010, 1110011, 1110100, 1110101, and 1110110, respectively.

8. The encoding apparatus according to claim 1, wherein, if a macroblock C is subjected to the field-based encoding, an expression ctx_mvd_field(C,k)=0 if $e_k(C)<3$, ctx_mvd_field(C,k)=1 if $32<e_k(C)$, or ctx_mvd_field(C,k)=2 if $3\leq e_k(C)\leq 32$ is satisfied,

where ctx_mvd_field(C,k) is first to third context models corresponding to motion vector information of the macroblock C and $e_k(C)$ is an evaluation function calculated as $e_k(C)=|mvd_k(A)|+|mvd_k(B)|$ where $|mvd_k(A)|$ and $|mvd_k(B)|$ are motion vector information of respective macroblocks A and B neighboring the macroblock C.

9. The encoding apparatus according to claim 8, wherein the macroblocks A and B neighboring the macroblock C belong to

the same parity field as that of the macroblock C.

10. The encoding apparatus according to claim 8, wherein, if the macroblock C is subjected to the field-based encoding and the macroblock X (X is A or B) neighboring the macroblock C has been subjected to frame-based encoding, the evaluation function $e_k(c)$ is calculated by converting the vertical component of a motion vector corresponding to the macroblock X to the equivalent for field-based encoding based on an expression $mvd_{1\_field}(X)=mvd_{1\_frame}(X)/2$,

where $mvd_{1\_frame}(X)$ is the vertical component of the motion vector of the macroblock X.

11. The encoding apparatus according to claim 8, wherein, if the macroblock C is subjected to field-based encoding, a context model ctx_mvd_field (C,k) is used for a second bin and a third bin of the motion vector of the macroblock C, the context model ctx_mvd_field (C,k) being the same as a frame-based context model ctx_mvd(C,k).

12. The encoding apparatus according to claim 1, wherein, if a macroblock C is subjected to the frame-based encoding, an expression ctx_mvd(C,k)=0 if $e_k(C)<3$, ctx_mvd(C,k)=1 if $32<e_k(C)$, or ctx_mvd(C,k)=2 if $3\leq e_k(C)\leq 32$ is satisfied,

where ctx_mvd(C,k) is first to third context models corresponding to motion vector information of the macroblock C and $e_k(C)$ is an evaluation function calculated as $e_k(C)=|mvd_k(A)|+|mvd_k(B)|$ where $|mvd_k(A)|$ and $|mvd_k(B)|$ are

motion vector information of respective macroblocks A and B neighboring the macroblock C.

13. The encoding apparatus according to claim 12, wherein, if the macroblock C is subjected to the frame-based encoding and the macroblock X (X is A or B) neighboring the macroblock C has been subjected to field-based encoding, the evaluation function $e_k(c)$ is calculated by converting the horizontal component and the vertical component of a motion vector corresponding to the macroblock X to the equivalents for frame-based encoding based on expressions

$mvd_{0\_frame}(A)=(mvd_{0\_top}(A)+mvd_{0\_bottom}(A))/2$ and

$mvd_{1\_frame}(A)=mvd_{1\_top}(A)+mvd_{1\_bottom}(A)$,

where $mvd_{0\_field}(X)$ is the horizontal component of the motion vector corresponding to the macroblock X and $mvd_{1\_field}(X)$ is the vertical component of the motion vector corresponding to the macroblock X.

14. The encoding apparatus according to claim 1, wherein, if a macroblock C is subjected to the field-based encoding, expressions $ctx\_ref\_field\_top(C)=a_t+2b_t$ and $ctx\_ref\_field\_bot(C)=a_b+2b_b$ are satisfied,

where ctx_ref_field_top(C) is a first context model corresponding to a reference field for a first field of the macroblock C, ctx_ref_field_bot(C) is a first context model corresponding to a reference field for a second field of the macroblock C, a_t is a parameter related to a first field of

a neighboring macroblock A, a_b is a parameter related to a second field of a neighboring macroblock A, b_t is a parameter related to a first field of a neighboring macroblock B, and b_b is a parameter related to a second field of a neighboring macroblock B,

where a_t, a_b, b_t, and b_b=0 if the reference field is the immediate previous encoded field or a_t, a_b, b_t, and b_b=1 if the reference field is not the immediate previous encoded field.

15. The encoding apparatus according to claim 1, wherein, if a macroblock C is subjected to field-based encoding, a context model corresponding to a second bin and a third bin for a first field and a second field of the macroblock C is the same as a context model ctx_ref_frame(C) for a macroblock encoded in a frame mode except that a Code_Number indicates not a reference frame but a reference field.

16. The encoding apparatus according to claim 1, wherein, if a macroblock C is subjected to the field-based encoding, a context model ctx_intra_pred_field(c) for an intra-prediction mode is defined in the same manner as a context model ctx_intra_pred_field(c) for the macroblock of the frame mode.

17. The encoding apparatus according to claim 15, wherein, if a macroblock C is subjected to the field-based encoding, a context model ctx_intra_pred_field(c) for an intra-

prediction mode is defined in the same manner as a context model ctx_intra_pred (c) for the macroblock of the frame mode, regardless of whether the macroblocks A and B neighboring the macroblock C are field mode or frame mode.

18. An encoding method for adaptively carrying out field-based or frame-based encoding processing at a macroblock level with interlaced scan image information as an input, the encoding processing including lossless encoding processing carried out based on a CABAC scheme, the encoding method comprising:

a lossless encoding step of carrying out the lossless encoding processing using a context model corresponding to a frame/field flag indicating whether the encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.

19. A recording medium having a computer-readable program recorded thereon for adaptively carrying out field-based or frame-based encoding processing at a macroblock level with interlaced scan image information as an input, the encoding processing including lossless encoding processing carried out based on a CABAC scheme, the program comprising:

a lossless encoding step of carrying out the lossless

encoding processing using a context model corresponding to a frame/field flag indicating whether the encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.

20. A program for adaptively carrying out field-based or frame-based encoding processing at a macroblock level with interlaced scan image information as an input, the encoding processing including lossless encoding processing carried out based on a CABAC scheme, the program enabling a computer to carry out processing comprising:

a lossless encoding step of carrying out the lossless encoding processing using a context model corresponding to a frame/field flag indicating whether the encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.

21. A decoding apparatus for decoding image compression information to restore the interlaced scan image information, comprising:

decoding means for decoding the image compression

information that is encoded using a context model corresponding to a frame/field flag indicating whether the encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.

22. A decoding method for decoding image compression information to restore the interlaced scan image information, comprising:

a decoding step of decoding the image compression information that is encoded using a context model corresponding to a frame/field flag indicating whether the encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.

23. A recording medium having a computer-readable program recorded thereon for decoding image compression information to restore the interlaced scan image information, the program comprising:

a decoding step of decoding the image compression information that is encoded using a context model corresponding to a frame/field flag indicating whether the

encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.

24. A program for decoding image compression information to restore the interlaced scan image information, the program enabling a computer to carry out processing comprising:

a decoding step of decoding the image compression information that is encoded using a context model corresponding to a frame/field flag indicating whether the encoding processing at the macroblock level is field-based or frame-based, a context model corresponding to a syntax element for carrying out the frame-based encoding processing, and a context model corresponding to a syntax element for carrying out the field-based encoding processing.